C.D. Howe Institute
Commentary

ISSN 0824-8001

Productivity and the Dollar

Commodities and the Exchange Rate Connection

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In this issue...

The chief culprit in Canada's relatively poor productivity performance is not the country's flexible exchange rate regime. The recent slide in the Canadian dollar has been caused mainly by the worldwide decline in the prices of nonenergy commodities, on which so much of Canada's economy depends. The flexible exchange rate regime has, in fact, helped to smooth the effect of falling commodity prices and made it easier to employ productive inputs elsewhere in the economy.

The Study in Brief

The recent slide of the Canadian dollar has evoked new outcries from opponents of the country's flexible exchange rate regime. It is, they say, undermining the economy's productivity performance. This *Commentary* refutes that claim. It also questions the role of the exchange rate in prolonging the country's dependence on commodity exports.

Critics argue that Canadian producers of internationally traded goods have been relying on a declining Canadian-US dollar exchange rate, rather than undertaking productivity-enhancing investments. This argument does not withstand scrutiny. And while a falling real exchange rate does inhibit investment in imported capital equipment, this effect can be offset by fixing the nominal rate only if the exchange rate regime itself is the cause of the decline.

An important policy issue arises here. If the exchange rate regime itself is the root problem, fixing the exchange rate would fix much that is wrong with the Canadian economy. But if the trouble lies deeper, fixing the exchange rate would fix nothing else and might make some things worse.

Some insight here is given by the "Bank of Canada equation," which has a good track record of explaining movements of the real Canadian-US dollar exchange rate as a lagged function of energy prices, nonenergy prices, and the two countries' short-term interest rate differential. Estimates of this equation for 1973 through 2001 suggest that the main culprit in the Canadian dollar's decline has been the worldwide decline in nonenergy commodity prices. Movements in the interest rate differential, and occasional flights of capital into the US dollar at times of crisis have also played a role. The implication is that a fixed exchange rate would likely have worsened Canada's productivity problems, because its maintenance would have forced deflation and recession on the economy, making investment less, not more, attractive, particularly since 1998.

The flexible exchange rate has not propped up the commodity sector. Instead, it has helped to smooth the effect of falling commodity prices and made it easier to employ productive inputs elsewhere in the economy.

Policymakers should certainly address productivity problems — not least by equalizing corporate tax rates across sectors — but in an economy already characterized by low inflation, they will find no quick fixes in tinkering with the exchange rate regime.

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$10.00; ISBN 0-88806-540-X

The Canadian dollar's dip in late 2001 and early 2002 was, predicably, the occasion for further discussion of the country's current and future international monetary arrangements. Among the many arguments that opponents of the current flexible exchange rate regime advance, one in particular continues to attract widespread attention: namely, that the Canadian dollar's depreciation has undermined Canadians' living standards and continues to do so. This *Commentary* examines this claim and suggests that it is ill-founded.

The crudest form of this argument, that "the inexorable decline of our currency is the equivalent of a national pay-cut" (Cooper 2001, 13), is clearly invalid. When Statistics Canada measures the cost of living for the "average" Canadian and summarizes its results in the consumer price index (CPI), the prices of imported consumer goods — including, among other things, vacations in the United States — are already taken into account. Thus, the CPI measure of inflation fully takes into account the effects of the Canadian dollar's depreciation on the purchasing power of the country's consumers. Even though the Canadian dollar has lost considerable ground relative to the US dollar since the beginning of the 1990s, CPI inflation over the same period has been low not only by historical standards but also relative to US inflation. The overall decline in the purchasing power of the Canadian dollar for people residing in Canada and earning and spending their incomes here has, therefore, also been historically low during the past decade. To suggest otherwise is to indulge in double counting.

A more sophisticated claim about the effect of the currency's depreciation on living standards is that it is undermining the economy's productivity performance (and, therefore, national income per capita) and that the fault here lies in the workings of the flexible exchange rate regime itself, rather than in any deeper forces. This argument merits much more serious analysis and, in what follows, we address the issue of the relationship between productivity performance and the exchange rate. We also take up related questions concerning the role of the exchange rate regime in prolonging Canada's dependence on commodity exports.

An Outline of the Paper

Commentators frequently suggest that Canadian producers of internationally traded goods and services have been relying on a declining exchange rate to keep them in business, rather than undertaking productivity-enhancing investments that would improve their international competitiveness. We argue that this belief is hard to square with conventional economic theory and, more important, with certain facts about the Canadian economy's productivity performance. We then go on to consider the possibility that a falling exchange rate undermines productivity performance by inhibiting investment in imported capital equipment. This point has both theoretical and empirical merit, but, we point out, such an effect flows from a falling *real* exchange rate, which can be offset by fixing the *nominal* rate only if the exchange rate regime itself is the cause of the decline.

This conclusion leads us to a discussion of the hypothesis that the Canadian dollar's depreciation has been largely the result of real factors that would still have been at work had the nominal exchange rate been fixed. Specifically, we update some of our previous work with the *Bank of Canada equation*, recalling first of all

that this equation successfully explains the real Canadian-US dollar exchange rate's behavior in terms of the interaction of three factors:

- nonenergy commodity prices;
- energy prices; and
- the US-Canada short-term interest rate differential.

In order to convert the results from real to nominal terms, we use the inflation differential between the same two economies.

We pay particular attention to the fact that this equation attributes the Canadian dollar's trend depreciation since the mid-1970s, as well as its fall since 1998, mainly to the behavior of nonenergy commodity prices, stressing that this factor is one whose impact would have imposed adjustments on the Canadian economy under any exchange rate regime. We also show that our previous estimate of this equation (Laidler and Aba 2001), which uses no data generated after 1995, can account for the Canadian dollar's further decline since that paper was published. (This work, it should be noted, makes allowance for the declining importance of commodities in Canada's trade over the past three decades.)

Next we examine suggestions that the workings of the flexible rate shelter commodity producers from falling prices, thus unduly delaying a market-induced contraction of this sector. We show that this hypothesis rests on an incomplete analysis of the working of a flexible exchange rate regime. We argue that that regime does not merely buffer the commodity sector from falling prices but also helps facilitate its contraction by easing the transfer of inputs, notably labor, from that sector to others, including manufacturing.

The dependence of Canada's real exchange rate on the prices of commodities is a result of the important role they play in our exports. This role is a reflection of Canada's comparative advantage in international trade, and to reduce it artificially would obviously be counterproductive. Nevertheless, long-run market trends seem to be bringing about a decline in the share of commodities in Canada's exports, so one must expect a decline in the importance of commodity prices in determining the real Canada-US exchange rate. We note, however, that the current structure of corporate taxation in Canada is, if anything, biased in favor of the commodity sector, a situation that is unjustifiable. On grounds of allocative efficiency alone, it would be desirable to eliminate this distortion and create a level playing field for all Canadian companies, regardless of the sector in which they operate. In the long run, such a move would have the side-effect of somewhat lessening the Canadian real exchange rate's sensitivity to commodity price variations.

Canada's real exchange rate has been declining largely because world commodity prices have been trending downward and Canada is an important producer and exporter of a subset of such goods.

We conclude by reiterating conclusions that we have drawn in earlier work. Canada's real exchange rate has been declining largely because world commodity prices have been trending downward and Canada is an important producer and exporter of a subset of such goods. So long as these facts persist, and so long as the United States remains a low-inflation economy, the choice for Canadian monetary policy is between low inflation and a declining nominal exchange rate on the one hand and a fixed exchange rate with domestic deflation on the other. Of these two alternatives, the former is clearly preferable. For Canadian economic policy, the task is to reduce the country's dependence on the commodity sector, but only to the extent compatible with the maintenance of overall economic efficiency and,

more generally, to achieve higher domestic productivity growth, which would help monetary policy to continue to yield low inflation without a depreciating currency. Such an outcome cannot be achieved by fixing the Canadian dollar's nominal exchange rate.

The Exchange Rate and Productivity Growth

Figure 1 tells the story of the Canadian dollar's nominal exchange rate against the US dollar over the past three decades. It also shows the ratio of Canadian prices to those of the United States. Over the period, the dollar has depreciated by a little more than one-third. In the 1970s and early 1980s, this fall could be attributed, to a significant degree, to the fact that Canada's inflation rate was higher than that of the United States, but since the early 1990s the same factor has been working in the opposite direction. If we are to explain the Canadian dollar's depreciation since the "great inflation" of the 1970s and early 1980s came to an end, we must look to other causes.[1]

Critics of Canada's current flexible exchange rate point in particular to the currency's depreciation since 1990. They also note another characteristic of the Canadian economy's performance during the ensuing decade: that its rate of productivity growth systematically lagged behind that of the United States. A well-known argument in economic theory is that, under a flexible exchange rate regime, the currencies of two countries with the same domestic inflation rate tend to move systematically in favor of the one with a higher rate of productivity growth and that, under a fixed rate, the latter experiences a higher inflation rate. Moreover, empirical evidence suggests that lower Canadian productivity growth has indeed helped to cause the Canadian dollar's decline.[2]

Evidence suggests that lower Canadian productivity growth has helped to cause the Canadian dollar's decline.

Nevertheless, commentators on the recent Canadian experience often suggest that causation runs in the opposite direction. They attribute Canada's relatively

1 Figure 1 reflects, nevertheless, some ambiguity about what facts need explaining. The Canadian dollar's decline since 1990 has been dramatic, but the figure also shows that its value was unusually high at that time, the exchange rate having already sunk to a little below 70 cents for a short while in the mid-1980s. Just how big a depreciation needs explaining and what economic significance to attach to it depend on whether one regards the trough of 1985 or the peak of 1990 as an anomaly.

2 The theoretical argument known as the *Balassa-Samuelson effect* (see Balassa 1964; Samuelson (1964) goes as follows. Under a fixed exchange rate, if the prices of tradable goods produced in two countries that trade with one another are set in international markets and if their tradable goods sectors dominate their domestic wage determination, then wages in each of their nontradable sectors move with the world price of tradables and the rate of productivity growth in its own tradables sector. The price of nontradables and hence the overall price level in the economy experiencing higher productivity growth in its tradables sector therefore rises faster than in the economy with lower productivity growth. If the same two countries are instead linked by a flexible exchange rate but experience the same domestic inflation rates, the currency of the higher productivity growth economy appreciates. In both cases, the fundamental force at work is the same: upward pressure exerted on a country's real exchange rate by higher productivity growth. For evidence suggesting that productivity performance has affected Canada's exchange rate, see Dupuis and Tessier (2000). If the productivity growth differential between two countries is centered on their nontradable sector, the Balassa-Samuelson effect is reversed, and there is evidence suggesting that the link between productivity growth and the real exchange rate is ambiguous (Murray, Zelmer, and Antia 2000).

Figure 1: ***The Canada-US Exchange Rate and Price Level Ratio, 1974–2001***

Sources: Statistics Canada; authors' calculations.

poor performance in productivity growth to the workings of the exchange rate mechanism — more specifically, to the depreciation it has permitted. Taking as a benchmark the exchange rate's *purchasing power parity* value — the rate at which one Canadian dollar can buy the same representative bundle of goods in Canada and the United States — they note that the actual exchange rate moved from a value significantly above this level (which stood at around 80 cents US in 1990) to one significantly below it by the end of the decade. This decline, they argue, has been not an effect but an important cause of slow productivity growth in Canada. Underlying this relationship, they postulate, are two potentially complementary mechanisms. We discuss them in turn.

The Lazy Manufacturer

The first mechanism is often termed the *lazy manufacturer* hypothesis. It suggests that the declining exchange rate has discouraged many firms, particularly exporters, from undertaking productivity-enhancing measures in a timely fashion when conditions in their sectors of the global economy have called for such actions.[3] The argument is that, as such firms have found themselves facing increasing competitive pressures from world markets, to which they should have responded by improving their efficiency, they have instead sheltered behind a declining exchange rate and survived without having to make such adjustments.

This idea is widely believed. To some extent, it derives plausibility from its superficial similarity to the other time-honored story that attributes adverse effects on productivity to high inflation. Perhaps its persuasiveness is further enhanced by the fact that inflation, being the product of lax monetary policy, is also frequently associated with a depreciating currency.[4] Note, however, that whatever the case in

3 These arguments are advanced in particular by Grubel (1999) and Courchene and Harris (1999). The phrase lazy manufacturer seems to have been introduced by John McCallum (1998), who, however, is skeptical of the argument.

4 These two arguments are quite distinct from one another. There are many good reasons for believing that inflation undermines productivity and its growth rate, but none at all for expecting an exchange depreciation *that is not itself a side-effect of inflation* to have similar effects. Inflation, particularly rapid and variable inflation, distorts the tax structure and creates investor uncertainty about the structure of relative prices. It thus undermines the efficiency of investment decisions. They become increasingly driven by tax considerations, rather than by a desire to increase economic efficiency, and their economic payoffs become harder to forecast over any but short...

Suggestions that the federal government or the Bank of Canada has been pursuing a soft-dollar policy are simply false.

the 1970s and early 1980s, the depreciation of the Canadian dollar since 1990 has not been a byproduct of high inflation brought about by lax monetary policy. During the past decade, inflation in Canada, running at about 2 percent annually, has been lower than at any time since the 1950s and even a little lower than that in the United States. Thus, suggestions that the federal government or the Bank of Canada has been pursuing a soft-dollar policy, as that phrase has long been understood, are simply false.

To apply the lazy manufacturer hypothesis to today's Canada is to suggest that poor productivity performance has been caused not by errors induced by uncertainty about a volatile price level and exchange rate but by decisions taken in the confident and accurate expectation that inflation would remain stable and that further depreciation of the currency would occur.

This hypothesis does not, however, stand up well to analytic and empirical scrutiny. Perhaps for this reason, even some critics of the current monetary order who advance it (notably Courchene and Harris 1999) are careful to term it a "conjecture." If productivity-enhancing measures had really been readily available to Canadian manufacturers in the 1990s and if they really would have undertaken them had the exchange rate not depreciated, then it must also be true that the declining exchange rate that permitted their survival presented those same manufacturers with significant profit opportunities that they failed to exploit.

Only if one believes that Canadian manufacturers are typically not profit-maximizers but rather *satisficers* — firms content to get by with some minimally acceptable level of earnings in exchange for a quiet life — can one argue that a declining exchange rate has permitted them to avoid difficult but productivity-enhancing decisions that the greater competitive pressures of a fixed exchange rate would have forced on them. One cannot definitively rule out this possibility, but overall, the evidence that firms' productivity performance responds to competitive pressures is extremely thin.[5] And plausible though the lazy manufacturer hypothesis seems in the context of a depreciating exchange rate, it has other implications that are much harder to swallow.

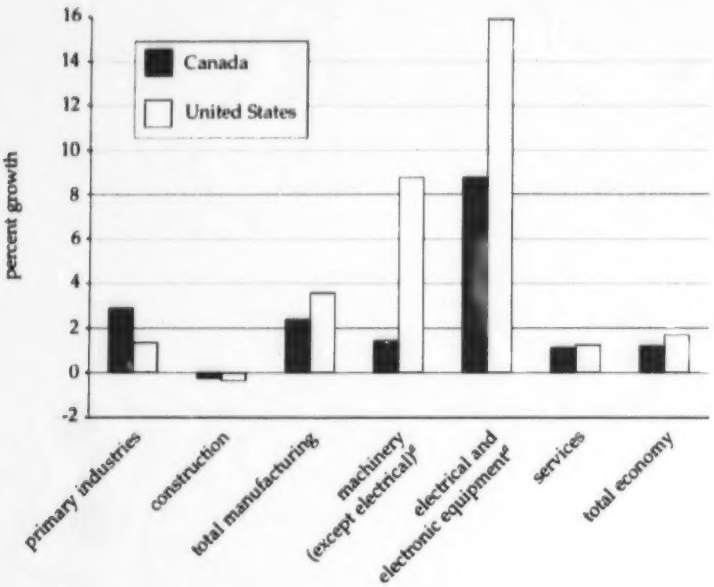
Consider, for example, that if the prospect of realizing lower Canadian dollar receipts for their output would really have encouraged Canadian manufacturers to take measures to ensure higher productivity growth in the 1990s, then the prospect of paying higher domestic taxes should have had the same effect. Defenders of the lazy manufacturer hypothesis do not, however, advocate higher corporate taxes as a productivity growth-enhancing measure, though the logic of their argument suggests that they should.

Note 4 - cont'd.

...periods. In an inflationary economy, planning horizons shorten, and the frequency of errors increases. Inevitably, the economy's productivity performance suffers. Howitt (1990) describes these phenomena in much more detail in what remains the classic treatment of the topic.

5 Nickell provides a general overview of theoretical arguments on this matter and concludes that "there is some theoretical basis for the belief that competition drives productivity improvements forward, but the basis is not, as yet, a strong one" (1996, 728). Baldwin and Caves (1997) assess the general effects on productivity growth of opening up economies to foreign competition and find that a rather thin body of evidence points to a positive effect. But the episodes they study involve much more dramatic changes in the economic environment than the mere replacement of a flexible by a fixed exchange rate in an economy with an already extremely liberal trade regime.

Figure 2: ***Labor Productivity Growth, Canada and the United States, 1989–99***



[a] Computer and office equipment are included in machinery in the United States and in electrical and electronic equipment in Canada.

Source: Adapted from Rao and Tang (2001), based on data from Statistics Canada and the US Bureau of Economic Analysis.

The most telling point against the lazy manufacturer hypothesis, however, is that it is hard to square with what we know about the facts of productivity growth in Canada and the United States in the 1990s. If the exchange rate was sheltering Canadian firms from competition to any important extent, it must have been doing so across the board. Any productivity gap that can plausibly be attributed to it should eventually have been widely dispersed across all sectors of the economy producing tradable goods.

The simple facts of the matter, however, are quite different. First, the spectacular productivity performance of the United States has been concentrated in only two sectors of manufacturing: machinery (except electrical) and electrical and electronic equipment. Second, the entire differential in Canadian-US productivity growth can be attributed to two further facts: that these sectors make up a smaller fraction of the Canadian economy, and that they have performed less well than their US counterparts. Figure 2 tells the story.

The Rising Price of Imported Investment Goods

These facts are difficult to reconcile with the lazy manufacturer hypothesis, but they are potentially important for explaining the productivity growth gap. The two manufacturing sectors produce investment goods, and their high productivity growth reflects the rapid increase in their efficiency with the passage of time. This result is hardly surprising, since these sectors produce equipment embodying the rapid advances in information and communications technology (ICT). Sectors that use such goods as inputs ought also to have been experiencing enhanced productivity growth (to the extent that they have been investing in ICT goods). A great deal of anecdotal evidence supports this conjecture. More important, however, systematic research is also beginning to reveal a pervasive relationship across countries between the rate of investment in such technology and productivity growth in the 1990s.[6]

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6 See Pilat (2001, especially 39, figure 6). His results are not directly applicable to explaining the data presented in our Figure 2 because he studies multifactor rather than labor productivity growth. (This broader measure is essentially a weighted average of the productivity growth of both the labor force and the capital stock.) It is worth recording here that Pilat's work shows...

Most Canadian firms buy ICT equipment from the United States, and the depreciating currency of the 1990s made it relatively more expensive here, inhibiting investment in such equipment. Here then is a channel whereby the Canadian dollar's performance could have been undermining productivity growth, and one that must be taken seriously.[7]

The first thing to be clear about here, however, is the nature of the fundamental force at work. To say that imported investment goods have been becoming increasingly expensive for the Canadian economy is the same thing as saying that a given quantity of Canadian-produced goods has been able to buy fewer and fewer imports over time. Or to put the point in a way that displays the economic fundamentals at work here, as Lafrance and Schembri (1999–2000) argue, a decline in Canada's *real* exchange rate (the price of Canadian-produced goods in terms of foreign-produced goods) inhibits productivity-enhancing investment because it reduces the incentives for profit-maximizing firms to substitute imported capital equipment for labor in their production processes.

Before one can attribute such effects to the workings of Canada's flexible exchange rate regime, one must establish that the decline in the real exchange rate that undoubtedly took place in the 1990s was not a response to forces originating outside that regime. If it was, then real depreciation would still have occurred through other channels, the relative price of imported investment goods would still have risen over the period, and productivity-enhancing investment would still have been discouraged.

Far from removing an obstacle to productivity-enhancing investment, policies designed to prevent the Canadian dollar from depreciating would have made the problem worse.

Indeed, with a fixed nominal exchange rate and low US inflation, a falling real exchange rate would have meant falling Canadian money wages and prices in the 1990s. Such a falloff would have required actual price-level deflation of as much as 2 percent.[8] Since only a slowdown in real economic activity could have forced such deflation on the system, a side-effect would have been a further reduction in the inducement for Canadian firms to invest in imported (or any other) equipment. Thus, far from removing an obstacle to productivity-enhancing investment, policies designed to prevent the Canadian dollar from depreciating would have made the problem worse.

The Canadian Dollar: Still a Commodity Currency

Whether or not the baleful effects of the Canadian dollar's recent depreciation are to be attributed to the exchange rate regime itself or to other, more fundamental factors is an empirical question, and an important policy issue hangs on the answer. If the exchange rate regime itself is the cause of the trouble, then fixing it would fix much that is wrong with the Canadian economy. If the trouble lies deeper, then fixing the exchange rate would fix nothing else and might make some things worse.

Note 6 - cont'd.

...that, on this measure, the Canadian business sector slightly outperformed its US counterpart over the 1992–99 period.

7 For a particularly effective presentation of this argument, see Harris (2000).

8 Robson (2001) provides these estimates. The real exchange rate is calculated as the product of the nominal exchange rate and the price level ratio. Thus, a falling real exchange rate and a fixed nominal exchange imply that the price level ratio must change.

The Bank of Canada Equation

In Laidler and Aba (2001), we argued that the depreciation in the 1990s can be explained by the following facts:

- The Canadian dollar began the decade at an unusually high value, created partly by contemporary high commodity prices and partly by the extremely tight monetary policy then in place.
- As the decade progressed, monetary policy was able to relax as inflation stabilized at a low level. Meanwhile, particularly after the Asian crisis of 1997–99, commodity prices fell significantly.
- In late 1998, financial upheavals associated with the Russian default of August 1998 imparted further downward pressure on the Canadian dollar as a side-effect of a flight to the quality of the US dollar in international financial markets.

We continue to believe in this explanation and now add that the behavior of the exchange rate over the past 12 months has been consistent with it. Commodity prices have continued to fall; the United States has imposed a substantial tariff on softwood lumber, an important Canadian commodity export; and the events of September 11, not to mention the problems of Argentina, have again produced flight-to-quality effects (albeit much milder than those experienced in 1998).

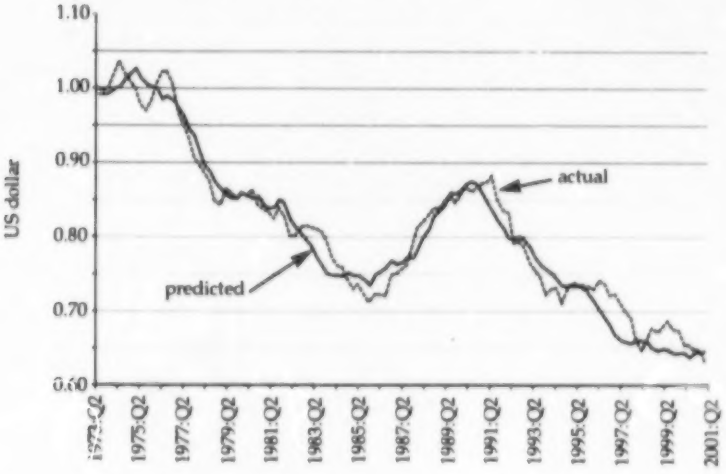
One of the curiosities of the literature on exchange rate regimes is that purchasing power parity commands so much attention and respect.

One of the curiosities of the literature on exchange rate regimes is that purchasing power parity commands so much attention and respect, not just as a concept to be deployed when making international comparisons of living standards — a purpose for which it is indispensable — but also as a theory of the long-run behavior of nominal exchange rates. Attesting to the idea's influence is the frequency with which Canadian debates about the exchange rate use *misalignment* synonymously with *deviation from purchasing power parity*. Yet, to use words in this way — to rely on purchasing power parity as a guide to the long-run equilibrium level of the nominal exchange rate — is equivalent to advancing the hypothesis that the only factor capable of causing that value to vary is a difference in the inflation rates of the Canadian and US economies or, to put the same point in another way, to argue that the long-run equilibrium value of the Canada-US real exchange rate is a constant. This hypothesis is highly unlikely, given that Canada is a major exporter of primary commodities and the United States is an importer of them, and given that the world prices of commodities are extremely variable.[9]

A model that explains movements in the real value of the Canadian dollar is the Bank of Canada equation, which was first developed in the early 1990s (see Amano and van Norden 1993; 1995). It is still performing well despite its extreme simplicity. This equation, as already mentioned, makes the real exchange rate a lagged function of three variables: the real price of nonenergy commodities, the

9 Interestingly, Rogoff (1996), in his influential survey of these issues, does not mention terms-of-trade changes as a reason advanced countries' exchange rates may deviate from purchasing power parity, even though they lie at the center of many discussions of the behavior of the exchange rates of less-developed commodity-producing countries. The tendency is to think of trade among advanced economies as being dominated by manufactures. The fact is, however, that the world has advanced economies for which commodity production is important, and Canada is one of them.

Figure 3: ***Actual and Predicted Values for the Canadian Dollar, 1973–2001***



Sources: Bank of Canada; authors' calculations.

real price of energy commodities, and the short-term US-Canada interest differential. The property that makes it "work" is its division of commodity prices into two components. Nonenergy prices enter the model's specification strongly and with the expected positive sign, but energy prices usually take a perverse sign, and sometimes, particularly when more recent data are used, are statistically insignificant.[10]

Of course, the equation does not explain every twist and turn in the exchange rate's behavior. It leaves some variations unexplained, and further research, again carried out at the Bank of Canada, suggests that, during these episodes, speculative pressures emanating from the foreign exchange market itself, rather than any more fundamental factors, are at work. Crucially, however, that same research suggests that such pressures tend to be temporary and that fundamental forces reassert themselves with increasing, ultimately decisive strength as the exchange rate moves away from the equilibrium path dictated by those fundamentals.[11]

Some New Results

The Bank of Canada equation used in our previous work (Laidler and Aba 2001) has been updated to reflect new data, and we adopted it to generate the estimated values for the Canadian dollar that are shown in Figure 3. Full statistical results and more detailed discussion appear in the Appendix. Suffice it here to note that we estimated the equation over the 1972–95 period (with the coefficient on

10 Why energy prices work in this way is a matter of debate. More generally speaking, it is not difficult to criticize the Bank of Canada equation for being simplistic, *ad hoc*, lacking fully articulated microeconomic foundations, and so on. No fully articulated economic model would treat prices as exogenous variables, as does this equation, and the literature dealing with it contains little discussion of the analytic simplification that may justify this procedure. But the equation's longevity is strong testimony to the fact that, notwithstanding its apparent theoretical weaknesses, economists are hard put to improve on its empirical performance.

On the specific matter of the perverse sign of energy prices, analysts advance two potentially complementary explanations. One is that Canadian manufacturing exports are particularly energy intensive, and thus the depressing effect of rising energy prices on their international competitiveness more than offsets the direct effect on the real exchange rate of the prices of energy exports themselves. The other, due to Helliwell (2000), is that the effect may be an econometric artifact stemming from the fact that large swings in energy prices are often associated with international political developments that trigger a flight-to-quality effect on the US dollar's international value.

11 The fullest account of these results, and of the techniques used to generate them, is Murray, van Norden, and Vigfussen (1996).

commodity prices allowed to take a different value in each decade, to pick up the effects of what is believed to be the declining importance of commodities among Canada's exports) and then used our results as the basis of a dynamic simulation to generate forecasts of the nominal exchange rate to the end of 2001.

The figure speaks for itself. Yet it is worth highlighting how well the equation picks up the exchange rate's decline in the mid-1980s and, as already suggested above, attributes its subsequent recovery to a combination of tight domestic monetary policy in Canada, and a worldwide commodity price boom. Perhaps this result is not surprising, because data drawn from this period were used to estimate the equation in the first place. But given that no data after 1995 enter the estimation, it is impressive that the equation also suggests that the decline in the exchange rate in the latter half of the 1990s — the episode that triggered the current round of criticism of Canada's exchange rate regime — was the predictable consequence of the behavior of commodity prices and interest rates over that period, and that its predictions have remained on track over the past 12 months.

Implications for the Debate about Productivity

The decline in the real exchange rate during the 1990s undoubtedly has made imported capital goods more expensive and may therefore have contributed to Canada's relatively poor productivity performance over that period. But there is no evidence that these effects should be attributed to the workings of the country's flexible exchange rate regime. On the contrary, our results are strongly consistent with the view that the dollar's depreciation has been the consequence of deeper-seated real forces, forces that have made a large fraction of Canadian exports less valuable than they previously were. Thus, under any kind of fixed exchange rate, adjustment over the past decade would have had to take place through falling domestic prices and money wages, and the relative price of imported investment goods would still have risen. Furthermore, as Lafrance and Tessier (2000) show, evidence suggests that remaining fluctuations in the exchange rate that cannot be attributed to fundamentals have had no adverse effect on investment and productivity growth. Hence, there is no evidence that the exchange rate regime itself has harmed the economy.

The dollar's depreciation has been the consequence of forces that have made a large fraction of Canadian exports less valuable than they previously were.

The only situation in which this conclusion would not hold would be one in which Canada's exchange rate follows commodity prices not because they are important for its equilibrium value but merely because market participants believe that these prices play an important role in determining the dollar's value. Two points argue against this possibility. First, like it or not, the significance of commodities among Canada's exports is a simple fact, not a figment of speculators' imaginations based on out-of-date information. These products still make up almost a third of the total. To be sure, this fraction is smaller than it was 30 years ago, but that decrease brings us to our second point: that our version of the Bank of Canada equation makes allowance for — and finds — a decline in the importance of commodity prices over the intervening period. This result again suggests that it is fundamentals, not the erroneous beliefs of speculators, that dominate the foreign exchange market.

At the very least then, a strong burden of proof rests on those who deny that fundamental factors have largely driven the flexible exchange rate over the past three decades and therefore claim that the regime has served Canada badly. In particular, the advocates of abandoning the arrangement should be required to explain either why a fixed exchange rate would not have imposed a deflation on Canada in the late 1990s or, if a deflation had occurred, how it could have been accomplished without a recession that would, in turn, have tended to reduce, not increase, the rate of investment and hence to contribute to a further worsening of Canada's productivity performance.

Other Criticisms

The lazy manufacturer hypothesis and the effects of exchange depreciation on investment are not the only reasons canvassed in arguing for a link between exchange rate flexibility and poor economic performance. Here we turn to brief discussions of two of them.

The Lazy Politician Hypothesis

The lazy politician hypothesis suggests that a flexible exchange rate regime enables politicians to evade taking the kind of tough policy decisions needed to keep a market economy functioning efficiently.

We take the liberty of giving the label *lazy politician hypothesis* to the first of these arguments because it has many parallels with the one about manufacturers presented earlier. It suggests that a flexible exchange rate regime enables politicians to evade taking the kind of tough policy decisions needed to keep a market economy functioning efficiently, whereas a fixed exchange rate would bring extra discipline to bear on the policymaking process.

Consider, however, that, since 1990, Canada has seen the inflation rate brought — and kept — under control and budgets brought back into balance, and even a surplus sustained, with extremely salutary effects on the ratio of public debt to gross domestic product (GDP) and on net foreign indebtedness. These effects were the results of policy measures that looked — and were — extremely difficult to implement but that were seen through and have gathered considerable public support. All this was done without the discipline of a fixed exchange rate.

We would not deny for a moment that economic efficiency in Canada still faces serious barriers that will require politically difficult policy measures to remove. At the same time, we suspect that the discipline needed to see such measures implemented would be more effective and reliable if it were generated from within Canada's internal political processes by the arduous process of opening and then winning debates about what must be done, rather than by trying to impose a monetary fix on an unwilling electorate.

The Exchange Rate and Sectoral Adjustment

The simple stylized fact that a large proportion of Canada's exports is made up of commodities while the United States is a commodity importer has run through much of our argument. It is the basis of yet another criticism of the flexible exchange rate regime: that the regime provides a special shelter to commodity producers and

is prolonging Canada's dependence on this "old economy" sector in an international environment that requires a fast transition to "new economy" activities.

Although Canada is an important player in some commodity markets, it cannot set world prices for such items as lumber, coal, and wheat. Those prices are in secular decline, and this falloff is surely a key factor in the exchange rate's decline. But it does not follow that under the existing regime the rest of the country suffers the consequences of a declining exchange rate solely to benefit the commodity sector, which would contract faster if the exchange rate were fixed. Of course, when world commodity prices fall, a depreciation of the dollar helps to cushion the *direct* impact on the commodity sector, relative to what it would be under a fixed rate. But that is not the end of the story.

The effect of falling commodity prices is to drive down Canada's real exchange rate under either a flexible or a fixed nominal exchange rate regime.

The effect of falling commodity prices is to drive down Canada's real exchange rate under either a flexible or a fixed nominal exchange rate regime. Falling prices give the commodity sector a signal to contract. With a fixed rate, the whole signal would be transmitted through a fall in the Canadian dollar price of the sector's output. Under a flexible rate, the signal comes through two channels. One is still direct, but it transmits a relatively muted signal when the nominal exchange rate is free to fall. The second channel is indirect: when the nominal exchange rate falls, manufacturing for export and for import substitution becomes more profitable, and manufacturers are able to employ resources released by the commodity sector or even bid them away from it.

The combined message transmitted in this way under a flexible rate is essentially the same as that conveyed through the single channel of falling commodity prices under a fixed rate, but it is an easier one for the economy to respond to. Under a fixed rate, the manufacturing sector is given an incentive to expand only if the resources —labor, in particular — that are released by the commodity sector are able to exert downward pressure on the wages and other input costs ruling in manufacturing. In the completely flexible labor market of the economics textbook, this pressure indeed occurs. The situation differs in the actual Canadian labor market, which is riddled with rigidities.

The Importance of Commodity Prices

Canadians have no influence over world commodity prices, which are so important in determining the real value of their currency. Whether this lack of market power is an actual problem or not, it is true that our analysis of the Bank of Canada equation suggests that the importance of commodity prices in determining the real Canada-US exchange rate has been declining over the past three decades, a change consistent with the fact that the share of commodities in Canada's exports fell from an average of 55 percent in the 1970s to 37 percent in the 1990s.[12] The real exchange rate's dependence on commodity prices is likely to continue to decline as Canada's export base becomes more diversified, and the workings of the flexible exchange rate do not inhibit this process.

12 Commodity exports have, however, remained stable at about 11 percent of GDP throughout the previous three decades.

Table 1: ***The Effective Tax Rate Net of Subsidies, including Taxes and Subsidies on Labor, Canada and the United States, 2000***

	Canada	United States
	(percent)	
Forestry	31.4	40.1
Mining	47.6	27.6
Oil and gas	27.9	18.5
Manufacturing	54.7	35.6
Construction	45.4	38.6
Transportation	58.0	36.7
Communications	50.1	29.5
Public utilities	45.2	27.6
Wholesale trade	64.8	41.2
Retail trade	28.5	16.8
Other services	35.9	36.2
Weighted average	47.9	33.7

Source: Adapted from Mintz (2001, 101, fig. 26), who assumes in his calculations that firms maximize their profits.

We do not advocate policies designed to artificially speed up the decline in Canada's dependence on commodity exports, but we are equally opposed to policies that inhibit its progress. To put the point differently, the pattern of international trade should be determined by comparative advantage and market forces, rather than by tax policies. Table 1 shows that Canada's current tax regime favors the commodity sector and, therefore, is probably helping to slow its relative contraction in the face of declining demand. For the forestry industry, for example, whose products account for 45 percent of the nonenergy commodity price index, the effective tax rates are among the lowest in Canada. Indeed, the forestry industry is practically the only one whose the tax burden is lower here than in the United States.

On simple grounds of economic efficiency, the Canadian government should consider leveling tax burdens across sectors of the economy, preferably by reducing rates across the board toward the low level enjoyed by forestry, rather than by increasing them towards the punitive levels currently imposed on manufacturing, transportation, communication, and wholesale trade. A beneficial side-effect of such a move in the long run might be a reduction in the dependency of the exchange rate on commodity prices.

Policy Implications

The policy implications of the above discussion are straightforward. The predominant influences on Canada's exchange rate in the 1990s have been real, not monetary, and the currency's weakness in recent months provides no exception to this generalization. The implication is that arguments that attribute Canada's relatively poor productivity performance in the 1990s to the exchange rate regime are misplaced, and that fixing the exchange rate, far from helping Canada's productivity problems, would more likely have made them worse.

None of this means that the level and growth rate of productivity in Canada are beyond improvement, that dealing with these matters does not present a serious challenge to policymakers, or that the attention currently being given to such problems (not least by Mintz 2001) is unwarranted. The creation of a level playing field for Canadian industries by equalizing corporate tax rates across sectors would be a useful move in this regard, and it would, as a helpful side-effect, encourage the diversification of Canada's export base and hence reduce the real Canada-US exchange rate's dependence on commodity prices.

Most important of all, the analysis presented in this paper implies that, in an economy already characterized by low and stable inflation, tinkering with the exchange rate regime offers no quick fixes for productivity problems.

Appendix: An Econometric Analysis of the Bank of Canada Equation

This appendix presents the equation we used to generate the predicted values for the exchange rate values shown in Figure 3. A more detailed discussion of the choice of variables is presented in Laidler and Aba (2001).

The Bank of Canada equation can be written as follows:

$$DRFX = \alpha(RFX_{t-1} - \beta - \gamma COM_{t-1} - \eta ENE_{t-1}) + \omega RDIFF_{t-1},$$

where DRFX is the change in the real exchange rate between one quarter and the next. RFX_{t-1} is the last quarter's level of the real exchange rate; COM_{t-1} is the last quarter's nonenergy commodities price index deflated by the US GDP deflator; ENE_{t-1} is the last quarter's energy price index, also deflated by the US GDP deflator; and, $RDIFF_{t-1}$ is the difference between Canadian and US 90-day prime corporate paper rates, an indicator of short-term interest rates. Finally, α, β, γ, η, and ω are coefficients estimated using regression analysis. We expressed all the variables except $RDIFF_{t-1}$ in logarithms and converted from the nominal to the real exchange rate by multiplying the nominal rate by the ratio of the Canadian GDP deflator to that of the United States.

Since the share of commodities in total Canadian exports has fallen during the past three decades, we have no reason to believe that the sensitivity of the real exchange rate to variations in commodity prices remained constant over that period. Our equation therefore allows for a different sensitivity estimate every decade.

The results are shown in Table A-1. The exchange rate has, in fact, become less sensitive to commodity prices over the years. The role of energy prices is still somewhat unclear as the coefficients on them do not differ from zero at the 90 percent statistical confidence level. This result is not new. It underlines the need for more econometric study of the changing properties of the equation.

Table A-1: ***Variables Used in Forecasts of the Value of the Canadian Dollar Presented in Figure 3***

Variable	Coefficient	t-probability	Long-Run Coefficient	Long-Run t-probability
Constant	–0.147	0.001	–0.929	0
RFX_{t-1}	–0.158	0.000		
COM_{t-1}, 1970s	0.097		0.613	0
COM_{t-1}, 1980s	0.085		0.538	0
COM_{t-1}, 1990s	0.048		0.306	0.09
ENE_{t-1}, 1970s	–0.039		–0.248	0
ENE_{t-1}, 1980s	–0.023		–0.148	0.01
ENE_{t-1}, 1990s	0.011		0.067	0.68
$RDIFF_{t-1}$	0.351	0.000		
	$R^2 = 0.43$ DW = 1.55			

Source: Authors' calculations.

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